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The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics across its 10 member countries: Cambodia, China, Indonesia, Laos, Malaysia, Papua New Guinea, the Philippines, Sri Lanka, Thailand, and Viet Nam. Its goal is to strengthen local capacity for the economic analysis of environmental problems so that researchers can provide sound advice to policymakers.

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Can a Carbon Tax Help The Poor? A Study From The Philippines

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Two issues feature prominently in international negotiations – the fight against climate change and the liberalization of trade. For countries in the developing world, the impact these issues will have on poverty is key. Can global warming be tackled and trade expanded without adversely affecting the billions of people who live an impoverished existence? A new study →

A summary of EEPSEA Research Report 2006-RR8, Tariff Reduction, Carbon Emissions, and Poverty: An Economy-Wide Assessment for the Philippines, by Erwin L. Corong, Economics Department, De La Salle University. Tel: 632-3030867. Email: coronge@dlsu.edu.ph

"Poverty headcount decreases if

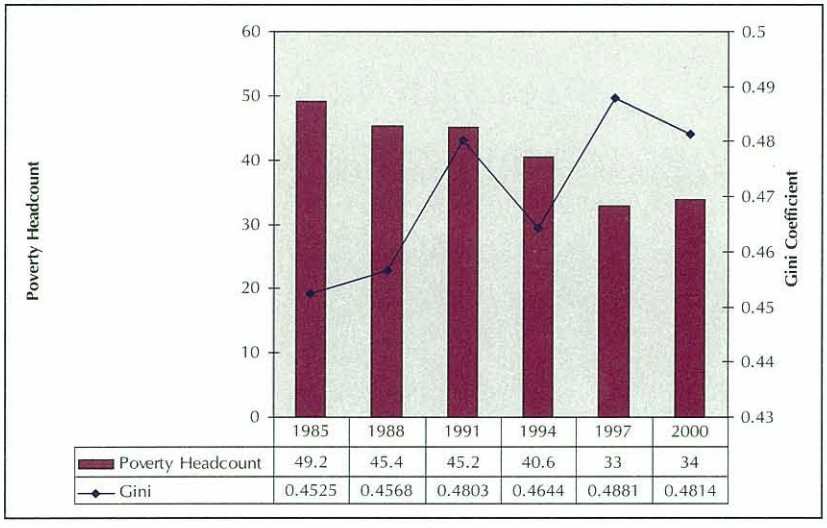
from the Philippines asked just this question. It finds that a well-designed combination of policies could reduce carbon dioxide emissions (the main cause of human-induced climate change) and reduce trade tariffs, with beneficial effects on poverty.

The study was conducted by Erwin Corong from the De La Salle University. One of the motivations for his work is the likelihood that the Philippines will have to act to tackle global warming in the not-too-distant future. The country has ratified the Kyoto Protocol and is formulating a Greenhouse Gas National Action Plan. This means that, although the Philippines is not formally obliged to control its emissions, the issue looms large on the national policy agenda.

Energy Use And The Need For Action

Another major driver for future action is the fact that demand for energy in the country has been increasing for over a decade. Forecasts indicate that energy use, primarily fossil fuels, is expected to grow by over 60 percent from 2003 to 2012. The country's fossil fuel-related CO_2 emissions are expected to increase by more than half within the next ten years. There is an increasing global consensus that if rapidly-growing developing countries do not play a part in reducing their global warming gas emissions, action by other countries will achieve very little. This makes it a matter of some urgency for the Philippines to investigate how it might act – and to look at the potential social repercussions of such action.

The policy measure favoured by many economists is carbon tax, because of the flexibility it provides to firms and households in deciding how to reduce energy use; this in return is likely to minimize the cost of those reductions. But a carbon tax could significantly affect fuel prices and so affect people's expenditures and livelihoods. This is a concern in the Philippines, where almost half of the rural population lived below the poverty line in the year 2000. In the same year, the country recorded the highest incidence of absolute poverty of any East Asian economy. Because so many people live such a precarious existence, any measure that might adversely affect people's livelihoods must be subject to stringent analysis.



	1985	1988	1991	1994	1997	2000
Poverty Headcount	49.2	45.4	45.2	40.6	33	34
Gini	0.4525	0.4568	0.4803	0.4644	0.4881	0.4814

Income Distribution and Poverty in the Philippines (1985 - 2000)

Source: Family Income and Expenditure Survey, NSCB (various years)

Why Does Trade Liberalization Matter?

The study examined the impact of a carbon tax in the context of the Philippine's on-going trade liberalization programme. This was done because trade liberalization can itself affect people's livelihoods and CO_2 emissions. For example, if the economy is stimulated by tariff reforms, energy use will go up and emissions will rise.

The country's policy in this area has a long history. It started after World War II when the Philippines pursued a policy of trade protectionism meant to stimulate domestic manufacturing. Unfortunately, this had a negative impact on the country's agriculture (its main foreign exchange earner) and caused its home-grown manufacturing industry to become uncompetitive. The country therefore started to reduce import tariffs in the 1980s. The agricultural sector, however, still has fairly extensive trade protection and this is thought to be one of the causes of widespread poverty in rural regions. Future reforms are planned to further liberalize the country's tariff structures.

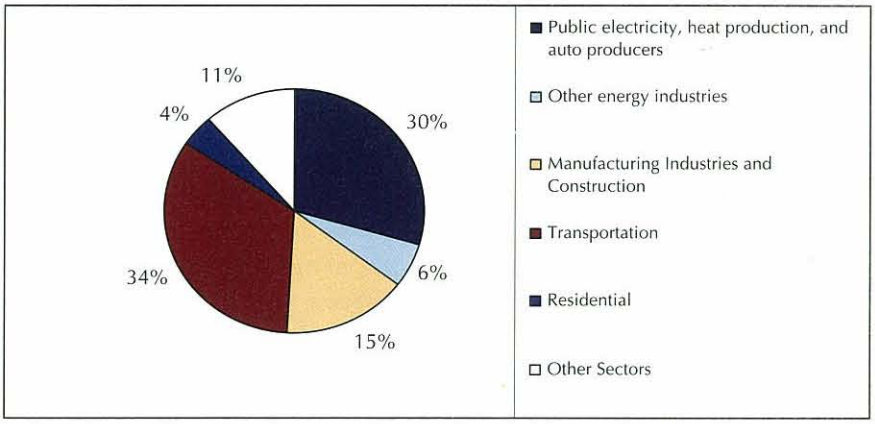
carbon tax revenue is recycled back to the economy"

Modeling The Economy

Because the issues under consideration are so interlinked, they needed to be analyzed using a model that can capture the workings of the whole economy. A Computable General Equilibrium (CGE) model was developed to do just this. The model broke the country's economy down into thirty-five producing sectors, including the various agricultural, energy and manufacturing sectors. It also modeled how changes in the functioning of the economy would affect the livelihoods of the various social groups that make up the country's population. The impact of any economic changes on carbon emissions was also analyzed. Emissions were estimated by using carbon-specific fuel coefficients, multiplied by the actual fossil fuel use of each economic sector.

The CGE model was used to investigate two questions: First, have the tariff reductions undertaken between 2000 and 2006 resulted in higher carbon emissions? Second, will the imposition of a carbon tax, to restrain carbon emissions, be favourable or harmful to firms, households and government?

The carbon tax used in the model was an ad valorem tax on different fuel type. Such a tax would lead to changes in relative energy prices, which would then result in changes in the relative price of goods and services. This, in turn, would alter production and the overall structure of the economy. Changes in relative prices, coupled with changes in economic structure, would alter household income and consumption patterns. Using the CGE model, it was possible to look at these changes – the main factors that determine economic welfare. As an overall indicator of poverty, the Foster-Greer-Thorbecke measure was used.



Sectoral CO_2 emissions (1999)
Source: World Resource Institute 2003

A number of different scenarios or simulations were tested using the CGE model. The first simulation modeled the effects of the tariff reductions of 2000-2006. Simulation 2 added a carbon tax of 100 pesos per ton of carbon emissions to this initial picture with the carbon tax revenue used to reduce household income taxes. In simulation 3, the carbon tax revenue was used to reduce indirect taxes on goods and services. Finally, a sensitivity analysis was undertaken in simulation 4 to assess the robustness of poverty reduction

Results As Expected

The results of the four simulations are consistent with what might be intuitively expected. Tariff reform alone (Simulation 1) lowered the cost of imported energy and resulted in an increase in carbon emissions. These decreases in fuel price led to an expansion of fuel-dependent manufacturing, away from the agriculture and service sectors. Consumers also benefited from lower commodity prices. Overall levels of poverty went down, but government employees and professionals were made worse off as a result of higher income taxes.

Simulation 2 (which combined trade reform with the imposition of a 100 peso carbon tax) produced a reduction in carbon emissions of one percent. In other words, in terms of emissions, the effect of the carbon tax outweighed the effects of tariff reforms. In terms of energy use, the prices of hydro and geothermal energy decreased (and usage went up) since they produce no carbon emissions. Overall, there was a reduction in the production and use of all fossil-fuel energy products except natural gas. This increased because natural gas has a low carbon intensity and was therefore used instead of more carbon-intensive fuels.

Tax Carbon, Not Income

In terms of its impact on the economy as a whole, Simulation 2 produced an expansion in agriculture and manufacturing and a contraction in the services sector. Relative wages declined, but the revenue generated by the carbon tax allowed income tax reductions that, on balance, left wage-earners better off. Moreover, the reduction in consumer prices caused by tariff reductions outweighed the increase in production costs caused by the carbon tax. Overall poverty was reduced and even poor agricultural and blue collar industrial workers were better off.

Simulations 3 and 4 produced similar patterns to Simulation 2. In general, a higher poverty reduction is attained whenever the carbon tax is used to reduce household income taxes rather than reducing indirect taxes on goods and services.

Carbon Taxes And Poverty

According to the model, tariff reduction results in a fall in poverty. Moreover, poverty decreases additionally whenever the carbon tax revenue is used to reduce household income taxes. This would allow the government to make reductions in household income taxes, yielding higher disposable incomes. These changes would offset any decrease in relative wages that would be caused by the carbon tax itself.

In summary, the simulation results suggest that a carbon tax would not only compensate for any tariff revenues foregone as part of the tariff liberalization process, it would also reduce poverty and increase welfare. Imposing a carbon tax during the ongoing trade liberalization process – provided that the carbon tax is used to reduce income taxes – is a sensible approach that may satisfy both the economic and environmental objectives of the country.

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